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Specific objectives of this phase of a nationwide study of vocational education were: (1) to determine the unit cost for vocational-technical education programs in a unified school district and in junior college district, (2) to determine the problems of data collection and analysis under present practices and legal requirements, and (3) to propose a program budgeting plan for high schools and junior colleges in California. The basis for comparison was established as the weekly student contact hour, that is, the number of instructional hours scheduled per student per week, in a semester. Wide differences in cost were found among the 18 high school vocational programs, varying from $11.48 to $26.94, due to class size, teacher salary, cost of supplies, and equipment maintenance. The unit cost for the junior college regular day vocational-technical education programs also varied widely, from a low of $16.19 for cosmetology to a high of $50.35 for registered nursing--due entirely to differences in average teacher salary. Program cost analysis of this type can produce a wide range of information useful to educational decision makers. Volume I and II are available as VT 008 833 and VT 008 831. (CH)

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FINAL REPORT

Project No. 8-0066
Contract No. OEG-0-8-080066-3478(085)

LEADERSHIP ROLE, FUNCTIONS, PROCEDURES AND ADMINISTRATION OF VOCATIONAL-TECHNICAL EDUCATION AGENCIES AT THE STATE LEVEL

Volume III

Program-Cost Analyses of Vocational-Technical Education in a Junior College and in a Unified School District

March 1969

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

Final Report

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Volume III

Program-Cost Analyses of Vocational-Technical Education in a Junior College and in a Unified School District

J. Chester Swanson
Director

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PREFACE

The Project, Leadership Role, Functions, Procedures and Administration of Vocational-Technical Education Agencies at the State Level, has been organized into three research studies which have been separately published under the following titles:

Volume I --- A Nationwide Survey of Vocational-Technical Education: Its Status and Organization on the State Level, Year 1966-67.

Volume II -- An Analysis of Factors Associated with Differences in Perceptions of State-Level Administration of Vocational-Technical Education.

Volume III -- A Pilot Study for a Planning-Programming-Budgeting System for Vocational-Technical Education Programs in Secondary Schools and Community Colleges.

These studies represent a continuation and expansion of an earlier research program undertaken by the same principal investigator whose findings were published in August 1967, under the title, A Nationwide Study of the Administration of Vocational-Technical Education at the State Level.

The research reported in Volume I of the current project was under the overall direction of J. Chester Swanson, project director, who assumed primary responsibility for the development and implementation of the study. Collection and tabulation of the data were the main responsibility of Elizabeth F. Cone. Statistical analysis of the data was under the direction of Phyllis A. Warren, the assistant project director.

The following State Directors of Vocational Education provided general counsel in the development of this nationwide survey of vocational-technical education: J.R. Cullison, Arizona; Wesley Smith, California; John Bunten, Nevada; William Loomis, Oregon; and Ernest Kramer, Washington.

Walter Arnold, former Assistant Commissioner for Vocational and Technical Education, and Edwin Rumpf, Division of Vocational and Technical Education served as general consultants to the project and

provided assistance and support to all the professional staff in the development and implementation of their various studies.

The research reported in Volume II was based upon the previous work of Allen Lee and Charles Achilles who designed and developed the Group Interview Guide, the data gathering instrument to assess perceptions of state-level administration of vocational-technical education. These data were further analyzed for the current study by Phyllis A. Warren under the general supervision of the Project Director.

The research design and development of A Pilot Study for a Planning-Programming-Budgeting System for Vocational-Technical Education Programs in Secondary Schools and Community Colleges (Volume III) was completed by J. Chester Swanson. This project was made possible through the active participation and cooperation of James Reusswig, Superintendent of the Stockton Unified School District, California; and Julio L. Bortolazzo, former Superintendent of the San Mateo Junior College District, California. Major assistance was given the research staff by Dr. Gordon L. Chamberlin, Associate Superintendent, Business, Stockton Unified School District; Robert F. De Bord, Coordinator, Vocational Education, Stockton Unified School District; William A. Goss, President, Cañada College, San Mateo; Matteo V. Fassanaro, Business Manager, San Mateo Junior College District; and Mrs. Irene Blutz, Assistant Business Manager, San Mateo Junior College District. Data collection and analysis were conducted by Harold Kinser, Robert G. Lewis, Lance Rogers, and C. John Van Zomeren.

It is hoped that these three studies can make a meaningful contribution toward greater understanding of the scope of the leadership role, function, procedures and administration of vocational-technical education at the state level.

J. Chester Swanson
Project Director

Berkeley, California
March 31, 1969

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Volume III: Program-Cost Analyses of Vocational-Technical Education in a Junior College and in a Unified School District

SUMMARY

Economists and others have long argued that an essential input to the educational decision making process is an accurate statement of the costs of various curricular programs as well as other school activities and services. Historically, the principles of financial planning and program reporting have not made instructional program cost analysis practical. There is now a growing demand to apply these principles of program (product) budgeting to social institutions, including our schools and colleges. In education as elsewhere the relationships among fiscal record keeping, program operation and decision making form a concept basic to such principles.

Unit costs or program costs are essential when one program or activity must be chosen from among alternatives in planning and budget making. The growing competition for funds makes a knowledge of program costs more important than ever.

A number of states and local school districts have recognized the importance of program budgeting and program-cost analysis and are presently engaged in pilot projects toward such accounting systems in local school districts. It is hoped that the studies reported here will have relevance to this overall effort and to the growing interest among states and districts elsewhere.

The specific objectives of this study have been:

1. To determine the unit costs for vocational-technical education programs in a unified school district and in a junior college district

2. To determine the problems of data collection and analysis under present practices and legal requirements

3. To propose a plan for program budgeting for high schools and junior colleges in California.

Two school districts were selected for the pilot study: the Stockton Unified School District (grades K-12) and the San Mateo Junior College District (grades 13-14). Among the reasons for choice of these two districts were:

1. Administrative interest in exploring the problems and possibilities of program budgeting and cost analysis

2. Representativeness of the two districts as rather typical California unified and junior college districts

3. Proximity to the Berkeley campus of the University of California.

Program-Cost Analysis of Vocational Education in a Unified School District

In the Stockton Unified School District there are three comprehensive and one vocational high school enrolling in all about 7200 students in grades 10-12. These students comprise about one-fifth of the total school population in the city of Stockton.

As a public school district, its standard accounting procedures and reporting systems are mandated by law. This standard procedure does not require cost data related to instructional programs.

Procedure

1. Determining the instructional programs for which costs were desired.

   The major classification was any program defined as vocational, i.e., specific instruction in knowledge and skills required for given paid occupations. Selected practical arts and academic programs were also analyzed for comparative program-costs.

2. Developing a list of sub-accounts to be prorated or allocated to a specific instructional program.

   Since the data would have to be obtained from the existing accounting classifications, these sub-accounts were in general related to such classifications.

3. Developing an equitable distribution and proration of current expenditures, direct and indirect, to programs of instruction.

   A panel of experts assisted the research staff in making judgments about prorations of indirect expenditures.

4. Determining a unit to be used as a basis for comparison and relating the expenditures to it.

   It was decided to use as a basis for comparison the Weekly Student

Contact Hour (WSCH)--the number of instructional hours scheduled per student per week per semester.

5. Comparing the expenditures per WSCH among vocational-technical programs and among some academic and general education programs.

Results

Among the 18 vocational programs offering in the Stockton senior high schools (including the vocational high school), wide differences in costs per WSCH were found. Dollar expenditures per WSCH varied from $11.48 to $26.94. The major reasons for this variability appeared to be:

1. Class size

   Per-pupil cost of teacher salary varies inversely with class size.

2. Salary of the teacher

   Teacher salary schedules are usually based upon level of education and years of experience. This means that these WSCH unit costs may differ by as much as 30-to 40-percent because of the placement of the teacher on the salary schedule. (In the junior college study, average costs rather than actual costs of teachers' salaries were used in determining total program costs.)

3. The cost of supplies and equipment maintenance

   The recording of expenditures for supplies and services should be distributed to specific program accounts at the time of requisition or delivery. Ex post facto distributions to programs tend to be inaccurate and time-consuming.

4. The sale of goods and services produced in the instructional process (abatements or negative costs).

Comparison of Costs among Vocational, Academic and General Education Programs

Vocational programs in the Stockton high schools tend to cost about one third more than do the non-vocational programs. However, there is some evidence of overlap. For example, foreign language instruction costs

about the same as the median for business education programs per WSCH. Practical arts program costs are in general less than vocational costs.

Program-Cost Analysis of Vocational-Technical Education in a Junior College District

The San Mateo Junior College is one of 85 public community colleges in California. It has a comprehensive curriculum, with large enrollments in vocational-technical programs of instruction.

As a public community college, the California public school standard accounting and reporting system is a mandated procedure. Hence, as in the Stockton schools study, the problem is one of utilizing standard accounting data in determining unit costs of instructional programs.

Procedures to collect and analyze data followed a pattern similar to that for the Stockton schools study with two notable exceptions:

1. The costs of instructors' salaries were adjusted to each instructor's average salary base .

2. Capital costs and interest charges were included in the total costs prorated to individual programs.

Results

The WSCH unit costs for the regular day programs of vocational-technical education varied widely, from a low of $16.19 for Cosmetology to a high of $50.35 for Registered Nursing--due entirely to differences in teachers' average salary. The correlation between instructional salaries per WSCH unit and total cost per WSCH unit appears to be highly significant.

There was also great variation among programs in both instructional equipment costs and capital costs. Many of these costs should be studied over a period of years to determine to what extent any one year was abnormal.

Comparison Costs of Various Junior College Programs of Instruction

The range of costs is much larger for the vocational-technical program, and the median costs are appreciably larger, than those of the academic and general education programs. The median costs of the vocational-technical programs are very near the maximum program costs of the general education programs.

Conclusions

One of the objectives of this pilot study was to determine the cost of operating vocational programs of instruction for a unified and for a junior college district. Results have been tabulated and discussed in Chapters III and IV respectively of this report.

When methods of calculating per-pupil costs for all senior high schools in Stockton for school year 1967-68 were compared, the per-pupil cost as derived from the general fund expenditures and from the program-of-instruction cost analyses were quite compatible.

A second, and more basic, objective of this study was to determine the problems related to developing instructional program costs under state-mandated accounting-reporting systems. It may be concluded that:

1. Instructional program costs can be developed within the present accounting-reporting system.

2. The process is tedious and time-consuming because the problem is essentially one of locating all records of expenditures and allocating or prorating these expenditures to specific programs of instruction.

3. Extensive knowledge of the nature of each instructional program is necessary in order to make the required subjective judgments. The accuracy of results--their reliability and validity--then depends upon the competence, insights, and conscientiousness of the individuals involved in these decisions.

The following modifications in accounting practices are recommended to expedite the process of determining unit costs of instructional programs:

1. Provide for the distribution or proration of the various expenditures to specific instructional programs at the time the expenditures are incurred, and by the persons who know most about the services, materials, facilities, etc.

2. Require that the allocations and prorations of expenditures be recorded for electronic data processing.

In conclusion, it may be stated that program-cost analysis of the type described in this pilot study can produce a wide range of information--information which can be so organized as to make a maximum contribution to the needs of educational decision makers.

Volume III: Program-Cost Analyses of Vocational-Technical Education in a Junior College and in a Unified School District

I. INTRODUCTION

Statement of the Problem

Increasing costs, expanding programs and competition for public funds necessitate more information if decisions by administration are to be made with confidence. Program-cost analyses, program budgeting, cost-effectiveness studies, PPBS (Planning/Programming/Budgeting Systems), etc., are all financial-program analyses and evaluations aimed at providing information in a form to enable administration to make more intelligent decisions.

Local school districts have developed and adopted fiscal accounting systems. Most states have developed standard financial accounting systems which are mandated for all school districts in the state. The Federal government has coordinated efforts among states to develop a national standard fiscal accounting system. This national standard accounting system has been revised a number of times by committees representing most of the states. Its category of accounts is in general followed by those states which mandate a standard accounting system. The accounting categories usually are:

Current Operation	Capital Outlay
Administration	Current Expenditures for Capital Items: Buildings and Major Equipment
Instruction	Debt Service: Amortization and Interest on previous expenditures for Buildings and Major Equipment.
Teachers' salaries	
Instructional supplies	
Instructional supervision	
Operation of Plant	
Maintenance of Plant	
Transportation	
Auxiliary Services	
Fixed Charges	

This accounting system has proved to be an accurate, logical system for planning a budget, reporting expenditures, and relating expenditures or

budgets to past years or to other school districts.

It does not provide the financial information on specific instructional programs or activities which administration must have for the decision making process. Unit costs or program costs are essential when one program or activity must be chosen from among alternatives in planning and budget-making. The growing competition for funds makes a knowledge of program costs more important than ever.

The details necessary to determine unit costs or program costs were impossible or impractical to obtain and process before the advent of electronic data processing. It is now practical to obtain the necessary breakdown of data in order to make such an analysis. Under present practices and legal requirements the problem is not to replace a traditional practice with a new accounting procedure--the problem is to develop an additional accounting practice and still maintain the present procedure.

Review of Selected Literature

Economists' and other scholars' studies have been indicating that education is probably more important to our country than historically has been recognized. The economists[1] have concluded that education

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[1] See the following as examples of such studies and statements:

Benson, Charles S., The Economics of Public Education. Boston: Houghton Mifflin Company, revised 1968.

Boulding, Kenneth E., "Expecting the Unexpected: The Uncertain Future of Knowledge and Technology," Prospective Changes in Society by 1980, Chapter XII. Denver: Designing Education for the Future, an Eight-State Project, 1966.

Clark, Harold F., Cost and Quality in Public Education. Syracuse: Syracuse University Press, 1963.

Schultz, Theodore W., The Economic Value of Education. New York: Columbia University Press, 1963.

Weisbrod, Burton A., External Benefits of Education, An Economic Analysis. Princeton: Industrial Relations Section, Princeton University, 1964.

may be an investment by a country, rather than an expenditure; but that information must become available as to (1) the costs of various educational programs and activities, and (2) the benefits or outcomes of such programs and activities, if a state or nation is to determine the economic value of education. Other scholars[2] are stating that our society has a critical need to improve the social and economic expectations of a large percentage of our citizens, and that public education must be a major factor in this improvement. The concerns of both economists and other scholars require the evaluation of present programs, the development of new programs, and the search for more effective programs. These activities in turn require unit costs, program costs, program alternatives and program evaluation. The more recent methods which have been suggested, and in some cases adopted, have been called: program budgeting, program-cost analysis, Planning/Programming/Budgeting/Systems, etc. These methods are all financial-program analyses and evaluation, with the objective of providing the decision makers in education with data giving costs related to

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[2] See the following as examples of such studies and statements:

Coleman, James S. and others, Equality of Educational Opportunity. Washington: U. S. Government Printing Office, 1966.

Gardner, John W., Excellence: Can We Be Equal and Excellent Too? New York: Harper Colophon Books, Harper and Row, 1961.

Kaufman, Jacob J. et al, The Role of the Secondary Schools in the Preparation of Youth for Employment, Chapters 1 and 12. University Park, Pennsylvania: Institute for Research on Human Resources, The Pennsylvania State University, 1967.

Task Force on Economic Growth and Opportunity, The Disadvantaged Poor: Education, pp 19-70 Washington: U. S. Chamber of Commerce, 1966.

program activities.[3]

The developing of unit costs for instructional programs and/or educational services has been considered for many years. Primarily these suggestions were developed by economists or school administrators who realized the contribution to be provided by budget planning which would use information on the costs of instructional programs or services. Harold Akerly, a school administrator with the responsibility for budgeting for the public schools in a large city, made a case for program budgeting in the early 1950's.[4] Harold F. Clark, an educational economist, has written on program costs and quality in education for twenty-five years.[5] In recent years the Association of School Business Officials and the Committee on Educational Finance of the National Education Association have given considerable attention to program budgeting, program-cost

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[3] See the following for examples of such studies and suggestions:

CEF, Proceedings of the National Conference on School Finance, 1965, 1966, 1967, 1968. Washington: Committee on Educational Finance, National Education Association.

Elkins, E. R., Program Budgeting. Morgantown, West Virginia: Bureau for Governmental Research, West Virginia University, 1955.

Mood, Alexander M. and Richard M. Powers, Cost-Benefit Analysis of Education. Washington: National Center for Educational Statistics, Department of HEW, Office of Education Report No. TN27 ED-012519, 1967.

Mosher, Frederick C., Program Budgeting: Theory and Practice. New York: Public Administration Service, 1954.

Novick, David (Ed.), Program Budgeting, Chapters 7, 10, 11, 12. Cambridge: Harvard University Press, 1967.

Vincent, Howard, Program Budgeting for Education--State and Local Governments. Washington: National Center for Educational Statistics, Department of HEW, Office of Education Report No. TN5, ED-012970, 1966. (10 pages.)

[4] Akerly, Harold E., "Use a Performance Budget," The Nation's Schools, February 1951.

[5] Clark, Harold F., The Economics and Politics of Public Education, Ch. V. Syracuse: Syracuse University Press, 1963.

analysis and cost-benefits of education.[6]

Some state departments of education and some city school systems are planning for and implementing accounting procedures, in addition to those mandated by law, which will give them instructional program costs and costs of certain services. Chicago, Memphis, Miami and Philadelphia are examples of city school systems which have done planning and developed at least some program-cost analysis accounting practices.

The Legislature of the State of California authorized an Advisory Committee on School Budgeting and Accounting in 1965 which reported to the Assembly in 1966. This project resulted in the Advisory Commission on School District Budgeting and Accounting within the State Department of Education which has been operating for several years. This Commission contracted with a commercial firm to develop plans for a Planning/Programming/Budgeting/System for the public schools of California. Pilot projects have been established in six school districts and these projects will be expanded into fifteen school districts for school year 1969-70.

An exploratory study in 1966 and 1967[7] proposed to apply a program budget to local school districts as a means of improving the decision making process. This study indicated that any local school district could develop

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[6] See:

Burkhead, Jesse, "The Theory and Application of Program Budgeting to Education," 1965 Report of NEA Committee on Educational Finance. Washington: National Education Association.

Hill, Donald W., "Program Accounting," Journal, CAPSBA, August 1966. Burlingame, California: California Association of Public School Business Officials.

Kroeger, L. C., "Cost Accounting your Personnel Dollar through Performance Budgeting," 1954 Proceedings, ASBO. Chicago: Association of School Business Officials of the U. S. and Canada.

Mushkin, Selma J. and James R. Cleaveland, "Planning for Educational Development in a Planning, Programming, Budgeting System," 1968 Report of NEA Committee on Educational Finance. Washington: National Education Association.

[7] Chamberlin, G. L., "A Program Budget for Education," unpublished Ed.D. dissertation, School of Education, Stanford University, Palo Alto, California, June 1967.

a program budget as an overlay of the present state-mandated budget and accounting system. It outlined five criteria oriented toward increasing the efficiency of the educational output of a school program: (1) hypothesis examination, (2) specialization of effort, (3) capitalization, (4) substitution of inputs, and (5) revenue qualification.

An analysis was made of the financial and operational data of the Worcester, Massachusetts high schools by an economist from Dartmouth College for school year 1963-64 to determine the costs of vocational education programs.[8] This analysis produced the following cost relationships for that year:

Table 1

Program Costs in Dollars and Percentages,
Senior High Schools, Worcester, Massachusetts
1963-64

	General Curric. High Schools		Girls' Vocational High Schools		Boys' Vocational High Schools	
	Cost per Pupil	Percent of Total Cost	Cost per Pupil	Percent of Total Cost	Cost per Pupil	Percent of Total Cost
Instructional Salaries and Wages	$380	84.1%	$683	86.0%	$834	78.1%
Teachers						
Supervisors						
Clerical et al						
Total Costs	$452	100.0%	$793	100.0%	$964	100.0%

[8] Corazzini, A. J., "The Decision to Invest in Vocational Education: An Analysis of Costs and Benefits," Journal of Human Resources Supplement: Vocational Education, 1968, pp 88-120. (Note: Some criticism has been made of the handling of the data in this study. This is however a most interesting analysis.)

Operational factors which were reported as explanation for the differences in these per-pupil costs may be outlined as follows:

Table 2

Factors Affecting Per-Pupil Costs
Senior High Schools, Worcester, Massachusetts
1963-64

	Classical High School	Girls' Vocational High School	Boys' Vocational High School
Pupil/Teacher Ratio	20.6/1	12.6/1	12.6/1
Guidance, Library and Health Services (Personnel Salaries)	40 $/pupil	X	23.5 $/pupil
Water and Electrical Power	5.10 $/pupil	18.80 $/pupil	30.00 $/pupil

The differences in pupil/teacher ratio and water-electricity are readily explainable and would be expected. The differences in Guidance, Library and Health Services are quite difficult to explain and would not be expected.

Professor Corazzini's analysis is quite unusual. The probable explanation why more program-cost studies have not been made is that the present accounting and reporting systems do not permit this kind of analysis without great expenditure of time and energy.

A report was made in 1967 of differential costs of curriculums in comprehensive junior colleges.[9] The results of this study are summarized in the following table.

[9] Anderson, Ernest F., "Differential Costs of Curriculums in Comprehensive Junior Colleges," 1967 Report of NEA Committee on Educational Finance, pp 182-184. Washington: National Education Association, 1967.

Table 3

Ratio of Vocational and Technical Curriculum
Unit Costs to Unit Costs of Liberal Arts Curriculums
in Comprehensive Junior Colleges

Curriculum Category	(Liberal Arts = 1:00)
General Education Programs	
Liberal Arts	1.00
Applied Arts	1.76
Vocational-Technical Programs	
Business and Office Occupations	.95
Public Service Occupations	.96
Dietetics and Home Economics Occupations	1.21
Health and Medical Occupations	1.49
Industrial and Technical Occupations	1.52
Engineering Technologies	1.95

Source of Data: Anderson, op. cit., p 184, Table 1.

From two to eight different junior colleges and two to 46 different curricula were involved in this analysis. Two colleges from each of four states were included. This study does not reveal as great a difference as is often accepted (and as reported in some other studies) in vocational and general education program costs.

In a more recent study to determine instructional program costs, E. L. Rogers used a method of analysis closely related to the method used in the current project.[10] Dr. Rogers was also a major researcher for the current project and some of the data developed in his study is reported in Chapter IV. Tables 8, 9, 10, 11 and accompanying text explain the method

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[10] Rogers, Edward de Lancey, "An Exploratory Study of Some Aspects of the Development of a System of Program Accounting for Junior Colleges in California," unpublished Ed.D. dissertation, School of Education, University of California, Berkeley, 1968.

of his study as applied to programs of instruction in a California junior college.

Much more needs to be done in developing instructional program-cost analyses for public school accounting practice. The studies reported here are significant moves in this direction.

Purpose and Objectives

As a part of the initial project of this research during 1966 and 1967 a study was made under the title, Analysis of Expenditures for Vocational-Technical Education Programs under the State Board of Vocational Education. This study attempted to determine certain program-cost relationships. It became evident that since program budgeting or program accounting systems were not in use, the relationships which were developed lacked validity to quite an extent. This lack of validity was due to the type of information available from the local school districts. This condition pointed to the need for unit costs and program-cost analysis at the local school district level before states could report fiscal data in a form which would permit program-cost relationships to be developed.

The State of California is very interested in program budgeting. The State Department of Education has established a plan to promote program budgeting in local school districts and is encouraging and establishing pilot and experimental projects with such fiscal systems in local districts.[11] The University of California School of Education has staff members with unique competencies in program budgeting. These are the conditions which prompted this study. The objectives were:

1. To determine the unit costs for vocational-technical education programs in a junior college and in a unified school district.

2. To determine the problems of data collection and analysis under present practices and legal requirements.

3. To propose a plan for program budgeting for high schools and junior colleges in California.

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[11] Advisory Commission on School District Budgeting and Accounting, The Development of a Planning, Programming, Budgeting System for California School Districts. Sacramento: California State Department of Education, 1966.

II. METHOD

Two school districts were chosen for this pilot study. These districts were chosen for the following reasons:

1. The administration of each of these districts was interested in exploring the problems and possibilities of program budgeting and cost analysis.

2. These school districts were somewhat typical of unified and and junior college districts in California.

3. These districts were within reasonable commuting distance of the University staff who were to make the studies.

4. The administrators of these districts had some acquaintance with and confidence in the staff who were to make these studies.

These conditions appeared to make it possible to achieve the objectives of this study by working with the district staffs. The research personnel met with the school district administration and operating staff members who were to be involved in the study. The nature of the study was described and working arrangements developed.

The process of data collection and analysis might be outlined as follows:

1. Determination of the vocational-technical instructional programs to be studied.

2. Agreement on the source of the data, the personnel to be involved, and the time schedule.

3. Convening of a panel of persons who could be classified as experts in the areas of instruction, administration and financial accounting. This panel attempted to determine the most equitable and reasonable proration of the present classification of expenditures among the programs to be studied.

4. Consideration and proration of expenditure accounts according to the panel's recommendations.

5. Relating of expenditures per vocational instruction program to the Weekly Student Contact Hours (WSCH). Weekly Student Contact Hour is defined as the number of hours a student is scheduled to receive instruction per week per semester.

6. Comparison of expenditures per WSCH among the various vocational-technical instruction programs and among some selected academic instruction programs.

7. Statement of certain conclusions regarding the comparison of the various unit costs of vocational-technical instruction, and regarding the relation of these program costs to academic instruction program costs.

8. Development of suggestions for the perfection of a continuing program budget system and its use for the administration of these programs.

III. PROGRAM-COST ANALYSIS OF VOCATIONAL EDUCATION IN A UNIFIED SCHOOL DISTRICT

Location of School District

The vocational education programs in the public schools of Stockton, California were chosen as the location for this study in high schools.

Stockton is a city with a population of approximately 100,000. It is about 100 miles east of San Francisco in the San Joaquin Valley. The city has access to the Sacramento River and the San Francisco Bay by a canal navigable to ocean-going ships.

San Joaquin County is the center of a highly productive agricultural area and with its shipping facilities it is significant in international trade. The school population is quite diverse, with about 22 percent of Spanish origin and 14 percent of African origin.

The Program of Instruction

The public schools of Stockton consist of thirty-two elementary schools (grades K-6), five junior high schools (grades 7-9), three senior high schools (grades 10-12), one vocational high school and some specialized schools--a continuation school, an adult education school, an MDTA[12] Center and two child care centers. The total enrollment for 1967-68 was divided as follows:

Elementary (grades K-6)	19,149 (57.0%)
Junior high school (grades 7-9)	7,213 (21.5%)
Senior high school (grades 10-12)	7,202 (21.5%)

The program of instruction for the high schools was comprehensive with college preparatory, general academic, practical arts and vocational courses in all the high schools. One high school had an enrollment of about 2900, two high schools had enrollments of about 1800 each, and the vocational high school had a few over 275 students. The more highly competent vocational students are permitted to spend a part of each day during their 11th and 12th grades enrolled in vocational-technical programs

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[12] Manpower Development and Training Act, an adult vocational school operated for the Federal government.

at the junior college which serves this area. The school district is committed to the construction of a technical training center in the near future, to serve more adequately the vocational education needs of Stockton and San Joaquin County.

The periods of instruction are 50 minutes each in the three high schools. The vocational school has 45-minute periods. Vocational classes during the 1967-68 school year varied from one period per day, five days per week to 7 1/2 hours per day, five days per week. Class size varied from nine students to 58 students--there was a teaching assistant in the larger classes.

The great variation in number of students per class and in number of hours of instruction per class per week makes a cost analysis on a per-class basis of very little value. In order to make an analysis with a unit which would permit a significant comparison, the Weekly Student Contact Hour (WSCH) was used. This unit is comparable regardless of number of hours scheduled per week or the class size. The proration and allocation of costs and expenditures was made on the basis of WSCH.

Development of Data

Stockton public schools are financed by local property taxes, with the help of state allocations, Federal funds and miscellaneous revenues. As a public school district, its standard financial accounting procedures and reporting system are mandated by law. This standard accounting procedure does not require cost data related to instructional programs. The problem of obtaining the expenditures related to any specific program of instruction was therefore one of making a detailed analysis of literally thousands of expenditures classified under such accounting categories as administration, instruction, supplies, maintenance, operation, fixed charges, capital expenditures, etc.; and allocating these expenditures to specific instructional programs.

The various procedural steps might be classified as follows:

1. Determining the instructional programs for which costs were desired. Our objective was vocational program-cost analysis, so the major classification was any program defined as vocational, i.e., instruction providing knowledge and skills for a specific paid-employment possibility. Selected pre-vocational and academic programs were also studied to be used as comparison program costs.

2. Developing a list of sub-accounts to be prorated or allocated to a specific instructional program. Since the data would have to be obtained

from the existing accounting classifications, these sub-accounts were in general related to such classifications. The major sub-accounts were:

A. Direct classroom expense

(1) Teachers' salaries with fringe benefits
(2) Instructional assistants' salaries
(3) Instructional supplies
(4) Other services, including clerical

B. Quasi-instructional services

(1) Supervision (Department chairmen, etc.)
(2) Leaves, study halls, aides

C. Non-teaching services

(1) School administration, including clerical
(2) Curriculum, guidance, etc
(3) Library and audio-visual aids
(4) Student activities direction
(5) Community relations
(6) Buildings and grounds

D. School district central services[13]

(1) General administration
(2) Business services
(3) General supervision and curriculum development

E. Abatements--negative costs

(1) Services sold
(2) Products sold.

There were numerous sub-sub-accounts to this classification; but expenditures were in the end placed in one of the above sub-accounts. Note that this procedure attempts to place expenditures of the Stockton public schools in an allocation to a specific instructional program.

3. Developing an equitable distribution of all expenditures, direct and indirect, to programs of instruction. The proration of expenditures to specific programs of instruction can at times be determined on the basis of a reasonable unit. Thus custodial service might be prorated

[13] Salaries, but not materials used, are prorated from the standard fiscal reporting accounts of operation and maintenance. Fixed charges and capital outlay accounts are not included in this analysis.

on a square foot of floor space used for the instructional program; personnel services might be allocated on hours per week spent on a specific program; etc. But there are many expenditures which can only be prorated on the basis of the judgment of an expert. On this rationale a panel of experts was asked to meet and make the judgments for the specific proration of costs. At times only one or two, or at least not all, members of the panel of experts were involved in a specific proration determination because all of the panel were not experts in each of the areas in which decisions had to be made.

The following persons served as experts to help make the proration judgments:

Arthur G. Becker, associate superintendent, instruction, Stockton Unified School District

Gordon L. Chamberlin, associate superintendent, business, Stockton Unified School District

Robert F. DeBord, coordinator of industrial and vocational education, Stockton Unified School District

Charles T. Glenn, assistant superintendent, business services, Sacramento City Unified School District

James L. Shannon, director, research and evaluation, Stockton Unified School District

James E. Waters, field representative, Bureau of School Apportionments and Reports, California State Department of Education.

Principals, various central staff members, and others were frequently helpful in obtaining desired information related to the proration and allocation of expenditures to specific programs of instruction.

4. Determining a unit to be used as a basis for comparison. The great range in size and instructional hours among the classes would invalidate any comparison of total cost of an instructional program, or even the total cost per student. For this reason it was decided to use as a basis for comparison the Weekly Student Contact Hour (WSCH)--the number of student instruction hours scheduled per week.

It became a very tedious, time-consuming task to go into all the financial records of the school district and collect the data for such an analysis. The procedure required the full time of three researchers for three months, with extensive help from the district's regular fiscal-accounting staff. Part-time services of the three researchers continued for six months more with help from the fiscal staff of the school district, consultants and panel members.

Program-Cost Analysis Results

Not all the details of the expenditures analysis will be presented in this report. Appendix A shows some of the details of the costing process for those interested in that phase of the Study.

Table 4 gives the total costs per Weekly Student Contact Hour for each of the vocational programs.[14] These data indicate that Machine Calculation and Filing, Typing. Vocational Food Service and Shorthand programs of instruction cost relatively the same per WSCH (about 11. 80 $/WSCH), and that Waiters, Waitresses and Bus Boys, Cosmetology, and Typewriter Technology cost approximately 50% more per WSCH (about 18. 66 $/WSCH).

The effective use of such data requires an analysis of the program operation to provide an explanation for the large differences in these unit costs. The major reasons for the higher costs appearing in this study were:

1. The size of the class. Per-pupil cost of teacher salary varies inversely with class size. This relationship of course is equally true of overhead and other general costs, but teacher salaries are the dominant factor. The decision making problem with relation to this factor is a very difficult one, "How does class size relate to the effectiveness of the teaching-learning process?"

2. The salary paid the teacher. Teachers' salaries are usually determined by the teacher's training and experience. The range may show a 100-percent difference in salary between the beginning and experienced teacher. This means that these WSCH unit costs may differ by as much as 30-to 40-percent because of the experience and training of the teacher. A low WSCH cost may therefore increase considerably with time, all other factors remaining the same. It should be noted that in the junior college study (Chapter IV) the panel of experts discussed this factor and recommended that the researcher allow for it to some degree by using

[14] A program is defined as a course or a sequence of courses within a specific occupational or content objective.

Table 4

Vocational Program Costs in Dollars per WSCH*
Stockton Unified School District Senior High Schools
1967-68

Vocational Program	Dollars per WSCH
Business Education	
Bookkeeping	14.31
Machine Calculation and Filing	11.48
Office Practice	14.50
Office Training	13.58
Shorthand	12.04
Typing	11.98
Food Education and Service Training	26.94
Homemaking Assistants	20.96
Vocational Food Service	11.72
Waiters, Waitresses and Bus Boys	18.96
Auto Mechanics	18.22 (18.08)**
Electronics	15.22 (15.02)**
Electronic Repair and Servicing	20.46 (20.26)**
Mechanical Drawing	15.38 (15.37)**
Metal Working	20.27 (19.96)**
Wood Working	14.43 (14.19)**
Cosmetology	18.31 (13.27)**
Typewriter Technology	18.70

* WSCH = Weekly Student Contact Hours per semester

**These are the actual final costs to the school district because the total expenditures have been reduced by charges for services or products sold, an abatement which reduces the gross expenditures.

an average teacher's salary rather than the actual salary paid a specific teacher. The researcher for the junior college study followed this suggestion in that analysis.

3. The cost of supplies and equipment-maintenance expenditures. In a few of these instructional programs the expenditures for supplies and vendor service of equipment amounted to eight percent or more of the WSCH unit cost: Cosmetology, 16%; Wood Working, 11%; Food Education and Service Training, 9%. The recording of expenditures for supplies and services could be made much more accurate if a system were established whereby such charges were distributed to specific program accounts at the time of requisition or delivery. It is necessary to make some distributions to program costs on very little evidence when such analyses are not made until after the accounts have been paid and closed, the expenditures charged only to a general account, a particular school or possibly the warehouse.

4. The sale of goods and services produced in the instructional processes. Instruction in Cosmetology requires clients, in order to teach the skills of the occupation. To make this instruction more extensive and varied, customers were accepted from outside the school and a fee was charged for this service. The fees amounted to a considerable sum, which was recorded as an abatement or negative cost to the operation of this program of instruction. The fees collected amounted to 46 percent of the net district WSCH costs. A similar condition existed for seven of the programs as indicated in Table 4. The amounts in the programs other than cosmetology were very small, but in some cases they could conceivably be increased to multiply learning experiences and improve cost effectiveness.

These data are not particularly useful until they can be compared to similar costs of other types of instructional programs. Table 5 provides similar WSCH costs for some of the other programs of instruction in the high schools of the Stockton Unified School District. These costs were developed in a manner similar to that used in developing the vocational costs. The academic or general instructional programs included many more students and many more teachers, so there is less possibility of unit costs being abnormal because of a low salary or other unique situation.

The WSCH unit costs for the seven general instruction programs were in general considerably lower than for most of the vocational programs. All unit costs except those for one program (physical education) were comparable to the lower WSCH unit costs for vocational instructional

Table 5

Non-Vocational Program Costs in Dollars per WSCH*
Stockton Unified School District Senior High Schools
1967-68

Instructional Department	Dollars per WSCH
Driver Education and Health	11.74
Fine Arts	11.37
Foreign Languages	13.22
Language Arts	12.13
Physical Education	9.21
Science and Mathematics	12.02
Social Studies	12.57

*WSCH = Weekly Student Contact Hours per semester

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programs. It is easy to explain this very low program cost because of the large enrollments in physical education classes. The categorical funds received from the state and Federal governments specifically for vocational programs would probably reduce many of the vocational program costs to the local school district to approximately the unit costs of these general education programs.

Table 6 is given to show the comparable WSCH unit costs of practical arts instructional programs which are often quite similar to vocational programs. These practical arts programs in general have a higher unit cost than the general curricular programs. This can be rather easily explained by the small class sizes and the considerable amounts of supplies and equipment required.

There are two extremes in this list of unit costs, the one Elementary Typing (low-cost) and the other Duplicating (high cost). Large class size explains the former. The duplicating program has a very high teacher's salary charge and a very small class size.

Table 6

Practical Arts Program Costs in Dollars per WSCH*
Stockton Unified School District Senior High Schools
1967-68

Instructional Department	Dollars per WSCH
Business Education	
Duplicating	24.87
General Business	14.00
Retail Selling	12.76
Typing	8.94
Auto Shop	13.76
Electronics	14.14
Mechanical Drawing	13.45
Metal Shop	14.66
Wood Shop	14.63

* WSCH = Weekly Student Contact Hours per semester

Practical arts programs are quite comparable to vocational programs and may be taught in the same classrooms or shops by the same teachers. Vocational classes tend to be smaller than these practical arts classes. Where there is a significant difference in WSCH unit costs in practical arts classes, it is usually due to a higher teacher-salary situation.

Table 7 is given to make these costs more readily comparable among the types of programs of instruction. This table indicates that the vocational program costs are somewhat higher than the practical arts. The explanation would appear to be that often the class sizes are approximately the same and often the vocational classes are but one or two periods per day--a fact which also makes the nature of the program quite similar in terms of equipment, space, etc. The comparative costs between the vocational and the academic and general education programs of instruction are quite different, with the vocational programs costing on the average about 33% more than the non-vocational programs.

Table 7

Comparative Costs of Various High School Programs of Instruction
Stockton Unified School District Senior High Schools
1967-68

	Program Costs in Dollars per WSCH* Unit		
	Vocational Programs	Practical Arts Programs	Academic and General Education Programs
Maximum Unit-Cost Program	26.94	24.87	13.22
Median Unit-Cost Program	15.30	14.00	12.02
Minimum Unit-Cost Program	11.48	9.29	9.21

* WSCH = Weekly Student Contact Hours per Semester

IV. PROGRAM-COST ANALYSIS OF VOCATIONAL-TECHNICAL EDUCATION IN A JUNIOR COLLEGE DISTRICT

Junior College District Location

The junior college district chosen for this study was the San Mateo Junior College District. San Mateo is the California county just south of San Francisco. This county developed first as an agricultural area and later became a bedroom community serving San Francisco. It now has six cities with populations of more than 25,000, and a total county population of 444,000--a growth of 89 percent from 1950 to 1960. It is a center for many sophisticated educational, technological and cultural activities.

San Mateo Junior College Curriculum and Enrollment

The San Mateo Junior College was founded in 1922 and serves the older youth and adult populations of the county. In 1968 a second junior college was completed and opened for students. A third college is under construction and will be opened for students in 1969. The curricula of these colleges are comprehensive, with large enrollments in vocational-technical programs of instruction and large enrollments of part-time students in adult evening and summer programs.

The San Mateo Junior College is one of 83 public community colleges in the state. It is operated by a local school board elected by the qualified voters within the college district boundaries. Its financing comes from local school taxes, state and Federal allocations and miscellaneous sources. The financial data for this study were developed from fiscal and operational records of school year 1965-66; some of the MDTA data extended into school year reports of 1966-67.

The junior colleges of California are subject to the standard accounting and reporting system of all the public schools (grades K through 14) of the state of California.

Development of Data

The problem of data collection was fourfold: (1) developing a list of programs for which program costs were desired; (2) developing a list of sub-accounts which must be allocated to or prorated among the various programs; (3) determining a method of prorating sub-account expenditures among the programs to be studied; and (4) determining a basic unit for analysis which could be used for comparison among the programs to be studied.

None of these problem areas required any new theoretical consideration or sophisticated research methodology. Needed was a new conceptualization of the relationships among fiscal record keeping, program operation, and decision making. This required considerable detailed examination of financial accounts and records of expenditures in order to allocate costs to an entirely different system of accounting. The procedure demanded an extensive knowledge of the instructional program and of the accounting practices, plus the exercise of expert judgment. The knowledge was obtained by the use of persons well acquainted with these factors in program operation, and by the expenditure of very extensive hours by the research staff. The exercise of expert judgment was achieved through use of the knowledge developed by the research staff, and by use of a panel or jury of experts for the necessary classifying and prorating.

The following persons served as a panel of experts to work with the researchers in making the decisions concerning (1) the sub-accounts to be classified, and (2) the proration or allocation of costs to the programs to be studied.

Dr. Oscar E. Anderson, coordinator of educational management, City College of San Francisco

Dr. Charles Benson, professor of educational economics, University of California, Berkeley

Dr. Ronald Cox, associate superintendent of public instruction, Division of Public School Administration, California State Department of Education, Sacramento

Dr. Robert DeHart, president, DeAnza College, the Foothill Junior College District

Dr. William Goss, vice-president, College of San Mateo

Dr. Edwin H. Harper, chief, Bureau of School Administration and Reports, California State Department of Education

Dr. Roy Jastram, professor of business administration, University of California, Berkeley

Dr. Jack London, professor of adult education, University of California, Berkeley

Dr. Harvey B. Rhodes, vice president, adult education, Modesto Junior College District

Dr. Courtland Washburn, fiscal specialist, Coordinating Council for Higher Education, State of California.

The cost-analysis was conceptualized so that each of the instructional programs to be considered was composed of a number of sub-costs. The following sub-costs were used:

1. "Raw cost" of instructors' salaries

2. Allocated or prorated "raw cost" of coordinators' and Division chairmen's salaries

3. Cost of instructors' salaries adjusted to the instructor's average salary base -

   This refinement was made because if a program included only one or very few instructors and they were very high on the salary schedule (usually with lengthy service), or very low on the salary schedule (usually new teachers), the final computed cost would show a great variation. This phenomenon was observed in the study of unit costs in the high school district (Chapter III).

4. Allocated or prorated cost of coordinators' and Division chairmen's salaries adjusted to average salary base

5. Allocated or prorated certificated salaries including fringe benefits.

6. Capital costs and interest charges

7. Division costs, including fringe benefits on allocation or proration of classified salaries

8. Allocated or prorated costs of audio-visual and audio aids, data processing, duplication, stenographic services, telephone switchboard service, and mail services

9. Allocated or prorated costs for dean of instruction and other supervisory personnel, including cost of their support personnel and/or other administrative personnel directly concerned with instruction

10. Instructional equipment costs.

These sub-costs were totalled and reduced to the WSCH unit costs for each of the instructional programs to be studied. A consideration of these sub-accounts will indicate that not all costs are included in the instructional programs. The costs which were not included were allocated and prorated to certain services which might be described as follows:

1. General administration services, e.g., president's office, vice president's office, etc., not directly engaged in supervision of instruction

2. Health services

3. Admissions and records services

4. Counseling, guidance, testing and placement services

5. Transportation and food services not specifically related to instruction.

The panel of experts making judgments as to cost-analysis and program allocation for this junior college part of the study felt that the five classifications of services outlined above should not be prorated among the instructional programs to be studied. This panel believed that effective decision making in regard to instructional programs would be more reliable with these general services not included in the unit costs. These costs of services were developed, however, and reduced to WSCH units. They could therefore have been added to the instructional program WSCH unit costs if desired.

All of the sub-accounts which were developed were converted to weekly student contact hours per semester (WSCH) and totaled to give the instructional program unit costs in dollars per WSCH. These costs were obtained for the following vocational-technical instructional programs:

Aeronautics
Cosmetology
Dental Assisting
Police Science
Registered Nursing
Vocational Nursing
Drafting
Electronics
Engineering Technician.

Manpower Development and Training Act Programs (PL 87-815)

These programs are very intensive instructional schedules and are not usually a part of the general or vocational-technical programs leading to an Associate of Arts diploma. These vocational programs are a responsibility of the U. S. Department of Labor in which the instruction is performed by a school with vocational instruction competency under a contract with the Federal government to cover 100 percent of the program operating costs. The following MDTA vocational programs were operated by the San Mateo Junior College during 1965-66 and expanding into the 1966-67 school year:

Electronic Assembler
Service Station Attendant
Stenographer (clerical)
Grocery Checker
Waiter-Waitress
Clerk-Typist
Clerk, General, Spanish Speaking
Tool and Die Maker Apprenticeship
Hotel-Motel Maid
Technical Illustrator
Licensed Vocational Nurse

The analysis of the data to develop these MDTA instructional program costs was performed in the same manner as for the other instructional programs. The costs for the MDTA programs are not strictly comparable with those of the other programs listed, because of their intensity and their complete financing by Federal funds, with some expenditure requirements unique to these programs. These data were also developed in terms of WSCH unit costs. This unit is particularly appropriate for these programs, which varied from classes of a few students for a few weeks of two-hour-per-week instruction, to classes of 45 students for 36 weeks meeting 30 hours per week.

Program-Cost Analysis Results

Many details of this tedious process of developing unit costs are not described in this report. For details the reader may consult an earlier study of a major researcher of this project who developed much of the junior college data as he studied all the programs of instruction for the same junior college.[15]

[15]Rogers, Edward de Lancey, op. cit.

The WSCH unit costs for the regular day programs of vocational-technical instruction are shown in Table 8. The nine programs ranged in WSCH unit costs from a low of $16.19 for Cosmetology to a high of $50.35 for Registered Nursing. This large difference was entirely in teacher's salary. The teaching salaries per WSCH for Registered Nursing were

Table 8

Program Costs of Vocational-Technical Instruction
in Dollars per WSCH, San Mateo Junior College
1965-66

Vocational-Technical Program	Dollars per WSCH*
Nursing, Registered	50.35
Dental Assisting	29.95
Engineering Technician	28.15
Aeronautics	23.76
Nursing, Vocational	22.77
Electronics	22.23
Drafting	19.44
Police Science	17.39
Cosmetology	16.19

* WSCH = Weekly Student Contact Hours per semester

Data developed from: Rogers, op.cit., Appendix C, pp 220, 221, 222

five times the cost of teachers' salaries for Cosmetology. The salary rates were higher in the former, and the number of students in Cosmetology was very much larger. The correlation between instructional salaries per WSCH unit and total cost per WSCH unit is so significant

that Table 9 is given to show these nine instructional programs in rank order of instructor's salary cost per unit and of total cost per unit. The fact that the rank order of salaries so nearly matches the rank order of total unit costs is strong evidence of the influence of salaries on the total costs. Table 9 indicates just how large the salaries are as a component of the total costs.

Table 9

Rank Order of Instructors' Salaries Compared
to Total Costs in WSCH Units, San Mateo Junior College
1965-66

Instructional Program	Rank Order Total Costs in WSCH Units	Rank Order Instructors' Salaries in WSCH Units
Registered Nursing	1	1
Dental Assisting	2	2
Engineering Technician	3	4
Aeronautics	4	5
Vocational Nursing	5	3
Electronics	6	7
Drafting	7	6
Police Science	8	8
Cosmetology	9	9

Data developed from: Rogers, op. cit., Appendix C, pp 209-223.

Table 10 shows the components of the total WSCH unit costs. These components are the sums of many sub-accounts which have been totaled for simplicity of comparison. This tabulation also shows the significance of instructional salaries in the total costs. It is interesting to note the great variation in instructional equipment costs and in capital costs.

Table 10

Summary of Sub-Accounts to Show Components of Total WSCH Unit Costs for Vocational-Technical Instruction Programs, San Mateo Junior College 1965-66

Instructional Program	Sub-Account Totals Expressed in WSCH Unit Costs						
	Adjusted Salaries for Instruction	Allocated Share of General Instruction Supv. & Division Supv. & Administr'n.	Fringe Benefits, Personnel Salaries	Instructional Equipment Costs	Audio, Visual, Clerical, Dup., Tel., etc. Servs.	Capital Costs	Total, all Instruction Costs
Registered Nursing	$40.30	$4.70	$3.06	$0.08	$0.74	$1.47	$ 50.35
Dental Assisting	17.14	4.96	1.40	2.51	0.74	3.20	29.95
Engineering Technician	13.00	5.03	1.01	2.45	0.74	5.92	28.15
Aeronautics	11.90	4.50	0.94	0.95	0.74	4.88	23.91
Vocational Nursing	14.60	4.68	1.20	0.08	0.74	1.47	22.77
Electronics	10.15	4.72	0.78	2.87	0.74	2.97	22.23
Drafting	10.47	4.72	0.80	0.20	0.74	2.51	19.44
Police Science	9.17	4.59	0.86	0.13	0.74	1.90	17.39
Cosmetology	7.80	4.61	0.60	0.61	0.74	1.83	16.19

Many of these costs would have to be studied over a period of years to determine to what extent any one year was abnormal. Audio, visual, clerical, duplicating, telephone, etc., services were prorated equally, indicating that the best judgment available was that these services were equally used by the various programs. Many of the variations in these components of the total costs can only be explained with a knowledge of the details of the individual program operation. This situation provides one of the major advantages of this type of analysis: it shows where to look for explanations of unique cost factors.

Table 11 gives the developed WSCH costs for the special instructional programs of the Manpower Development and Training Act. These MDTA

Table 11

Program Costs of Manpower Development and Training Act Vocational Instruction in Dollars per WSCH, San Mateo Junior College 1965-66 and 1966-67

Vocational Program	Dollars per WSCH*
Electronic Assemblers	31.42
Service Station Attendant	27.62
Stenographer (clerical)	24.50
Grocery Checker	23.70
Waiter-Waitress	22.93
Clerk, General, Spanish Speaking	22.34
Tool-and-Die-Maker Apprenticeship	19.47
Hotel-Motel Maid	19.14
Technical Illustrator	17.85
Vocational Nurse	17.36
Clerk-Typist	11.34
Average Program Cost, MDTA	20.02**

* WSCH = Weekly Student Contact Hours per semester

** A weighted average depending upon the number of weekly student contact hours in each program

instructional programs are usually thought to cost more than the regular day school programs. In this analysis the median WSCH unit costs of the regular vocational programs and the MDTA programs (see Table 13) were within less than two percent of each other, with the MDTA the lesser of the two. The regular programs have the single largest program unit cost and the MDTA programs have the smallest program unit cost.

Table 12 is given to show the relation of these vocational-technical program unit costs in comparison with similar unit costs for academic and

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Table 12

Program Costs of Academic and General Education Instruction
in Dollars per WSCH, San Mateo Junior College
1965-66

Instructional Category	Dollars per WSCH*
Fine Arts	22.94
Mathematics-Engineering	21.08
English	18.76
Foreign Language	17.21
Physical Science	16.03
Physical Education	15.86
Life Science	14.62
Business, Clerical and Office	14.56
Social Science	11.33

* WSCH = Weekly Student Contact Hour per Semester

Data developed from: Rogers, op.cit., Table I, p 98

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general education programs. An overall comparison of these unit costs from Tables 10, 11 and 12 is shown in the tabulation in Table 13 of the maximum, median and minimum costs.

Table 13

Comparative Costs of Various Junior College Programs of Instruction
San Mateo Junior College
1965-66

	Program Costs in Dollars per WSCH* Unit		
	Vocational-Technical Programs	MDTA Vocational Programs	Academic and General Education Programs
Maximum Unit-Cost Program	50.35	31.42	22.94
Median Unit-Cost Program	22.77	22.34	16.03
Minimum Unit-Cost Program	16.19	11.34	11.33

* WSCH = Weekly Student Contact Hour per Semester

The range of costs is much larger for the vocational-technical programs and the median costs of the vocational programs are appreciably larger than those of the academic and general education programs. The median costs of the vocational programs are very near the maximum program cost of the general education programs. However, there are some vocational programs of instruction with lower costs than some of the general education programs.

V. CONCLUSIONS

One of the objectives of this pilot study was to determine the cost of operating vocational programs of instruction. The costs were developed for a unified and for a junior college district, and results have been presented in the various tables. Costs of general and academic programs of instruction were determined in the same manner, and tabulations developed, in order to provide some comparable data.

One might summarize these cost data in a more related form by computing the costs in dollars per student per year. In order to compare the data as presented in WSCH units with the more commonly used reporting unit, it will be necessary to make some assumptions and then to compute the costs in dollars per student per year. This computation will necessarily be somewhat different for the high school programs and the junior college programs if the assumptions are to be realistic for the two types of institutions.

The High School Program-of-Instruction Costs in Dollars per Student per Year

We will assume for the high school program of studies the following conditions which would be normal for many programs of instruction:

1. That the vocational student in the maximum-, the median- and the minimum-cost programs is scheduled for three hours per day (15 hours per week) in vocational programs and three hours per day (15 hours per week) in academic or general education programs.

   This assumption will require that the vocational WSCH unit cost be multiplied by 15 to obtain the cost of the vocational part of the student's program, and that the non-vocational-program WSCH unit cost be multiplied by 15 to obtain the other half of his weekly schedule cost. These costs are then added to obtain the program cost for the total 30 contact hours per week per semester.

2. That the student in the maximum-cost vocational program will also be in the maximum-cost non-vocational program and similarly for the median-and minimum-cost computations.

3. That the cost will be on a total school-year program. These total weekly program costs therefore must be multiplied by two because the WSCH unit was developed on a semester base.

The per-pupil cost per year for these programs is given in Table 14. It is interesting to note that the per-pupil cost per year calculated from the general fund expenditures for all the senior high schools in Stockton for school year 1967-68 was given as $771.31, including all expenditures except Food Services, Community Services, Transfers and Capital Outlay. The program-of-instruction cost analysis totals appear to be compatible with the general fund expenditures total cost per pupil per year.

Table 14

Comparative Costs Computed in Dollars per Student per Year
Stockton Unified School District Senior High School Programs
1967-68

	Vocational Programs	Practical Arts Programs	Academic and General Education Programs
Maximum-Cost Program	1202	1140	793
Median-Cost Program	801	762	721
Minimum-Cost Program	608	552	553

The Junior College Program-of-Instruction Costs in in Dollars per Student per Year

The junior college program costs can be tabulated in a manner similar to that used for high school programs. Some assumptions must be made in order to make the necessary computations.

It is assumed for the maximum-, the median-, and the minimum-cost programs that:

1. Vocational-technical students are scheduled for 25 contact hours per week per semester (five hours per day, five days per week).

2. Manpower Development and Training Act vocational-technical students are scheduled for 35 contact hours per week per semester, (seven hours per day, five days per week).

3. Academic and General Education students are scheduled for 18 contact hours per week per semester.

Table 15 shows the costs per student per year computed upon the above assumptions. This tabulation illustrates the difficulty of presenting costs in terms of dollars per student per year. This table indicates that MDTA costs are from twice to almost three times academic-general education costs. But the MDTA student is using almost twice as much teacher time and building/equipment/supplies time as the academic-general education student.

Table 15

Comparative Costs Computed in Dollars per Student per Year
San Mateo Junior College Programs
1965-66

	Vocational-Technical Programs	MDTA Vocational Programs	Academic and General Education Programs
Maximum-Cost Program	2518	2199	826
Median-Cost Program	1138	1564	577
Minimum-Cost Program	810	794	408

Problems in Superimposing Program-Cost Analysis on State-Mandated Accounting-Reporting Systems

A more basic objective of this study was to determine the problems related to developing instructional program costs under present financial reporting practices in a junior college district and in a unified school district in

California. The following statements might be made as a summary of the problems and difficulties involved in superimposing a program-cost analysis system on the state-mandated accounting-reporting system.

1. Instructional program costs can be developed within the present accounting-reporting system.

2. The process is tedious and time consuming. Additional help was necessary for a period of several months.

3. The problem is essentially one of locating all records of expenditures and allocating and prorating these expenditures to specific programs of instruction.

4. Extensive knowledge of the nature of each instructional program is necessary in order to make the required judgments. This need can be met only with the careful assistance of many personnel from the accounting, instructional and administrative staffs.

5. The accuracy of the results depends upon the competence of judgment of the individuals involved and upon the careful and insightful attention of the Study staff.

6. This type of accounting analysis can produce a wide range of information and can be organized to give the information in a form which will contribute most directly to the needs of the decision making process.

7. The accounting practice which would contribute most to the accuracy and the efficiency of the costing process is the distribution or proration of the various expenditures to specific instructional programs at the time the expenditures are made and by persons who know most about the services, materials, facilities, etc.

8. The accounting practice should require that the allocations and prorations of expenditures be recorded for electronic data processing.

APPENDIX A

Major Accounts in WSCH Units
Stockton Senior High Schools
1967-68

Appendix A - Major Accounts

Part I. Direct Classroom Expenses in WSCH Units, Stockton Senior High Schools 1967-68

Vocational Programs of Instruction	Salaries Related to Instruction	Supplies and Non-Maintenance Services	Sub-Total, Direct Expenses	Abatements (Receipts for Products and Services)
Business Education				
1 Bookkeeping	9.97	.32	10.29	---
2 Machine Calculation and Filing	7.14	.32	7.46	---
3 Office Practice	10.16	.32	10.48	---
4 Office Training	9.24	.32	9.56	---
5 Shorthand	7.70	.32	8.02	---
6 Typing and Typing Lab.	7.60	.32	7.92	---
7 Food Education and Service Training	19.70	2.34	22.04	---
8 Homemaking Assistance	15.18	.88	16.06	---
9 Vocational Food Service Training	6.82	---	6.82	---
10 Waiters, Waitresses and Bus Boys	12.87	1.19	14.06	---
11 Auto Mechanics	12.93	.66	13.59	(-.14)
12 Electronics	9.83	.61	10.44	(-.20)
13 Electronic Repair	14.82	.89	15.71	(-.20)
14 Mechanical Drawing	10.31	.70	11.01	(-.01)
15 Metal Working	14.18	1.12	15.30	(-.31)
16 Wood Working	8.02	1.58	9.60	(-.24)
17 Cosmetology	10.46	2.99	13.45	(-5.04)
18 Typewriter Technology	12.96	1.90	14.86	---

Appendix A - Major Accounts

Part II. Overhead Salaries in WSCH Units, Stockton Senior High Schools, 1967-

Vocational Programs of Instruction	Quasi-Instructional Services*	Non-Teaching H. S. Services**	General Administrative Services***	Sub-Total Overhead
Business Education				
1 Bookkeeping	.36	2.56	1.10	4.02
2 Machine Calculation and Filing	.36	2.56	1.10	4.02
3 Office Practice	.36	2.56	1.10	4.02
4 Office Training	.36	2.56	1.10	4.02
5 Shorthand	.36	2.56	1.10	4.02
6 Typing and Typing Lab.	.71	2.56	1.10	4.37
7 Food Education and Service Training	.23	2.56	2.11	4.90
8 Homemaking Assistance	.23	2.56	2.11	4.90
9 Vocational Food Training and Service	.23	2.56	2.11	4.90
10 Waiters, Waitresses and Bus Boys	.23	2.56	2.11	4.90
11 Auto Mechanics	.21	2.56	1.58	4.35
12 Electronics	.21	2.56	1.58	4.35
13 Electronic Repair	.21	2.56	1.58	4.35
14 Mechanical Drawing	.21	2.56	1.58	4.35
15 Metal Working	.21	2.56	1.58	4.35
16 Wood Working	.21	2.56	1.58	4.35
17 Cosmetology	1.21	2.56	1.09	4.86
18 Typewriter Technology	.19	2.56	1.09	3.84

* Includes Leaves, Study halls, Substitutes, Aides, Department chairmen.
** Includes Building level administration, Curriculum, Guidance, Library, Audio Visual, Director student activities, Buildings and grounds.
*** Includes Superintendent, Associate superintendent for instruction, Associate superintendent for business.

Appendix A - Major Accounts

Part III. Totals in WSCH Units, Stockton Senior High Schools, 1967-68

Vocational Programs of Instruction	Sub-Totals: Direct Classroom Expenses	Sub-Totals: Overhead Salaries	Totals	Abatements (Receipts for Products and Services)
Business Education				
1 Bookkeeping	10.29	4.02	14.31	---
2 Machine Calculation and Filing	7.46	4.02	11.48	---
3 Office Practice	10.48	4.02	14.50	---
4 Office Training	9.56	4.02	13.58	---
5 Shorthand	8.02	4.02	12.04	---
6 Typing and Typing Lab.	7.92	4.37	12.29	---
7 Food Education and Service Training	22.04	4.90	26.94	---
8 Homemaking Assistance	16.06	4.90	20.96	---
9 Vocational Food Service Training	6.82	4.90	11.72	---
10 Waiters, Waitresses and Bus Boys	14.06	4.90	18.96	---
11 Auto Mechanics	13.59	4.35	17.94	(-.14)
12 Electronics	10.44	4.35	14.79	(-.20)
13 Electronic Repair	15.71	4.35	20.06	(-.20)
14 Mechanical Drawing	11.01	4.35	15.36	(-.01)
15 Metal Working	15.30	4.35	19.65	(-.31)
16 Wood Working	9.60	4.35	13.95	(-.24)
17 Cosmetology	13.45	4.86	18.31	(-5.04)
18 Typewriter Technology	14.86	3.84	18.70	---